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ORIGINAL ARTICLE

Factors Influencing Industrialized Building System (IBS) Project Performance: A Systematic Review

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ABSTRACT – Industrialized Building System (IBS) is a form of construction with focused processes comprise of methods, products and a set of connected components which work together to achieve objectives. Malaysian construction industry is one of contributors towards the development of the country. To ensure vitality of construction performance, utilization and application of IBS is the right system to shift to from the current conventional construction method. Adaptability of IBS in Malaysia's construction industry is very low due to various limitations and barriers. To better understand IBS, this paper performs a systematic review of studies underpinning the factors influencing IBS success. From a total of 111 articles reviewed in this paper, 16 factors were highly mentioned, such as *knowledge and expertise*, *cost of construction*, *training*, *Communication, Lean Construction, Government Policies*, *Contractors' Satisfaction, Integration of Resources, Utilization of Software*, *Market Factor, On-site Management, Technical factor, Integrated Processes Assessment, Management Factor, Payment Issues, and Employee Empowerment*. These factors significantly influence IBS project performance.

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INTRODUCTION

Introduction of modern technologies as well as building system innovation development has contributed significant influence towards many aspects of construction industry. Construction industry in Malaysia benefited well through fundamental transformation by implementing IBS throughout the whole industry. The application of the Industrialized Building System (IBS) in Malaysia started in 1963 but still, participation and adoption of IBS in the local construction industry is relatively low compared to other developed countries (Nawi et al., 2015, Jabar et al., 2019). In 1999, "The IBS Strategic Plan" was launched. Following that, the IBS Roadmap 2003-2010 was introduced in 2003 to promote IBS in the effort to reduce dependency on foreign site operatives, improve governance and integrity of management on site, whilst advancing towards a more systematic approach to construction (Jabar et al., 2019). In 2008, government has made it mandatory for every contractor in Malaysia to achieve a minimum of 70% IBS content for every project, thereafter replacing the IBS Roadmap 2003-2010 to IBS Roadmap 2011-2015 (Jabar et al., 2019).

These plans were to support development towards a more extensive IBS implementation among construction projects in Malaysia. Malaysia houses a competitive construction environment, yet very labour intensive, which makes the Malaysian Government continuously encourage application of modern methods of construction to achieve a healthy and sustainable construction industry environment (Nawi et al., 2019). Being among the main contributor towards the development of the country, the construction industry in Malaysia need to ensure performance of the industry meets minimum standards as well as client requirements, and adhering to standards, integrity and governance on site. To ensure the vitality of performance within the construction industry, construction players are encouraged to shift towards modern method of construction through the utilization and application of IBS (Yunus et al., 2016). IBS is an alternative method to replace conventional construction to achieve sustainable deliverables (Yunus et al., 2019).

In conventional methods of construction, building components are prefabricated on site and require intense labour as well as high cost for raw material transportation (Jabar et al., 2019; Rubio-Romero et al., 2014; Yip et al., 2019). As generally known, intense activities are the most natural aspects of conventional on-site work which can cause a bad environment such as traffic chaos, noise and air pollution (Akmam et al., 2018; Yunus et al., 2019). By removing some or most of the work off-site, it will greatly contribute towards harmonization of development with surrounding environment. The application of off-site prefabrication and modularization can also significantly contribute towards productivity gains, decreasing labour requirements, as well as improving working condition not just among workers who are directly involved in the project, but also its surrounding environment (Akmam et al., 2018; Yip et al., 2019; Yunus et al., 2019). IBS is a form of system or a technique to manufacture components for construction of structures in a controlled environment. However, how one defines and perceives IBS can differ according to various reasons.

The objective of this paper is to highlight factors that can significantly influence IBS project performance through systematic review of articles. Articles will be divided into themes of IBS and factors will be derived from these themes. The highlighted factors will then be discussed in terms of which factor is the most influential based on the most mentioned factor through careful review of each articles.

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